

REMARKS

IDS CONSIDERATION

Applicants filed an Information Disclosure Statement on February 17, 2005. In the Office Action of February 5, 2008, Applicants did not receive an initialed Form 1449 indicating that the Examiner has considered the art that was cited. Applicants respectfully request that the Examiner provide an initialed Form 1449 with the next Action for this case.

§101 REJECTIONS

Claims 13-23 were rejected under 35 U.S.C §101 because the claim was asserted to be directed to non-statutory subject matter. In particular, it was asserted that since Applicants defined computer-readable medium as including communication media, which includes a carrier wave, claims 13-23 are non-statutory.

With the present amendment, Applicants have amended claims 13-23 to change “a computer-readable medium” to “a computer-readable storage medium.”

On page 6, lines 9-10, Applicants define computer-readable media as comprising computer storage media and communication media. Computer storage media is then defined as including tangible computer-readable media such as RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical disk storage, magnetic cassettes, magnetic tape, magnetic disk storage, or other magnetic storage devices, or any other medium which can be used to store the desired information and which can be accessed by computer 110. (Specification at page 6, lines 15-23) Communication media on the other hand is described as including instructions on a modulated data signal such as a carrier wave. (Specification at page 6, lines 23-28)

Since Applicants have distinguished computer storage media from communication media and further since computer storage media is defined as tangible computer-readable media that does not include carrier waves, the amendments to claims 13-23 limit those claims to tangible computer-readable storage media. As such, claims 13-23 are statutory.

§103 REJECTIONS

Claims 1-12 were rejected under 35 U.S.C §103(a) as being unpatentable over Acero ("Environmental Robustness in Automatic Speech Recognition" IEEE 1990) in view of Arslan (U.S. Patent 5,706,395, hereinafter Arslan).

With the present amendment, the limitations of claims 7 and 8 have been added to claim 1 and claims 7 and 8 have been cancelled.

As amended, claim 1 provides a method of identifying a clean speech signal from a noisy speech signal. The method includes receiving an observation vector representing a segment of a noisy speech signal and estimating a clean speech value and a noise value based on the observation vector. The clean speech value and the noise value are used to set a gain for a filter wherein the gain is defined as a ratio with the denominator of the ratio comprising the sum of the clean speech value and the noise value and the numerator of the ratio that is a function of the clean speech value and the noise value. The observation vector is applied to the filter to produce a filtered clean speech vector representing a segment of a clean speech signal.

As amended, claim 1 is not shown or suggested in the combination of Acero and Arslan. In particular, neither reference shows or suggests setting the numerator of a gain ratio for a filter as a function of a clean speech value and a noise value determined from an observation vector for a noisy speech signal. In the Office Action, it was asserted that column 11, lines 25-35 of Arslan, shows a "filter gain numerator that is an estimate of the input speech signal, which is a function of clean and noisy speech." Applicants respectfully dispute this assertion.

In column 11, lines 25-35, Arslan describes a Wiener Filter as having a transfer function of:

$$H(\omega)^2 = P_s(\omega) / [P_s(\omega) + \alpha P_N(\omega)]$$

In this equation, the numerator is $P_s(\omega)$, which Arslan states is "an estimate for the speech power spectrum." Throughout Arslan, the variable S is used to represent the clean speech signal. The noisy speech signal is referred to using the variable Y. Thus, in the cited section, Arslan indicates that the numerator is a function of only the clean speech signal, and is not a function of both a clean speech value a the noise value.

Applicants note that in other parts of Arslan, Arslan defines the Weiner Filter as having a numerator of $P_y(\omega)$ (see column 11, line 56, through column 12, line 4). However, as indicated in the remainder of column 12, Arslan does not use a clean speech value and a noise value in a function to determine the noisy speech value. Instead, Arslan calculates the noisy speech value directly from an input noisy speech signal. In fact, Arslan introduces the conversion from a clean speech value in the filter to a noisy speech value in the filter so that it can use the noisy speech signal directly without having to estimate the clean speech signal. This is substantially different from the invention of claim 1 wherein both a clean speech value and a noise value are determined from a noisy speech signal and then a function of the clean speech value and the noise value is used as the numerator of the filter gain ratio.

As indicated by Arslan, using a clean speech value and a noise value in the numerator of a filter is not obvious since it is easier to use a noisy speech signal and since estimating a clean speech value and a noise value has inherent errors. As such, those skilled in the art would not estimate a clean speech value and a noise value from a noisy speech signal and then use the clean speech value and the noise value in the numerator of a filter as found in claim 1. Therefore, claim 1 and claims 2-6, 9 and 10, which depend therefrom, are patentable over the combination of Acero and Arslan.

CLAIMS 13-23

Claims 13-23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Acero in view of Arslan.

Claim 13 provides a computer-readable storage medium having computer executable instructions for obtaining an estimate of a clean speech value and an estimate of a noise value derived from a noisy speech signal. A numerator of a filter gain ratio is set as a function of the clean speech value and the noise value. A denominator of the filter gain ratio is set as a function of the clean speech value and the noise value. The filter gain ratio is then used in a filter that is applied to the noisy speech signal.

Independent claim 13 is patentable over the combination of Acero and Arslan because neither reference shows or suggests setting a numerator of a filter gain ratio as a function of a clean speech value and a noise speech value estimated from a noisy speech signal.

As noted above for claim 1, the filter ratio shown in Arslan does not show a numerator as a function of a clean speech value and a noise value derived from a noisy speech signal. Instead, the numerator in Arslan either shows just a clean speech value or a noisy speech value. As such, claim 13 and claims 14-23 which depend therefrom, are patentable over the combination of Acero and Arslan.

CLAIM 24

Claim 24 is a new independent claim representing claim 12 rewritten in independent form. In the Office Action, claim 12 was indicated as being allowable if rewritten in independent form. As such, claim 24 is in form for allowance.

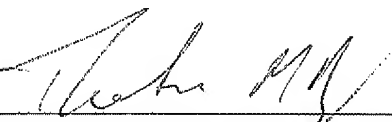
CONCLUSION

Based on the above remarks, claims 1-6 and 9-24 are in form for allowance. Reconsideration and allowance of the claims is respectfully requested.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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